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AUTHOR	Lacher, Miriam R.
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ABSTRACT

Effects of lower versus middle class parental occupation, verbal intelligence, and action content of pictured stimuli upon nonverbal serial recall were investigated in white first-graders attending a semi-rural elementary school in southeastern Michigan. Forty lower class and 20 middle class children, (half boys and half girls) were grouped on the basis of sex, social class membership and scores on the Peabody Picture Vocabulary Test. Children were given two trials and asked to recall a sequence of three color photographs out of six from each of four arrays following a 15-second delay between them during which photographs were reshuffled. Arrays consisted of (1) static objects (comb, zipper, glass of milk, guitar, steering wheel, hammer), (2) static objects-in-action (manipulated by hands), (3) activities (push, pull, lift something , run, jump, hang on the bars), and (4) faces (angry, happy, scared, sad, sleepy, stubborn). Occupation-intelligence yielded no main effects. Recall was higher for pictured static objects than for actions, and for objects in action than for faces and activities. A class-intelligence interaction with action content supported the underlying cognitive-developmental theory, while suggesting that intelligence is a better predictor than occupation in a small integrated community. Assumptions about encoding processes were explored using children's verbal and action labeling plus verbal report. (Author/WY)

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The Relation of Verbal and Nonverbal Encoding to Serial Recall Performance in Middle and Lower Class Children[1]

Miriam R. Lacher

Carleton College

The ability to spontaneously create verbal strategies for the performance of learning tasks develops in the five-to-seven age range. Somewhat younger children use words as cognitive aids only when prompted. Flavell, Beach, and Chinsky (1966) termed this ability verbal production and its absence in younger children production deficiency. Lower class and ethnic minority children manifest production deficiencies revealed in several learning paradigms including the task used by Flavell et al., in which noun labels are rehearsed to facilitate nonverbal serial recall (Gratch, 1966). Since verbal production may be demanded in formal learning situations, it becomes important to consider the nature of the deficiency in the light of social class differences.

Bernstein's (1961) theory of social class differences in learning modes of communication and the cognitive developmental theory of Bruner (1964, 1966) and Piaget suggest that production deficiency is symptomatic of reliance upon ontogenetically prior nonverbal (sensori-motor and visual) modes. The present study attempts to relate serial recall performance to mode of encoding between social strata. Variation in mediational process is experimentally stimulated by varying action content of stimulus pictures. Major hypotheses concern recall scores from which encoding processes may be inferred.

First, with regard to pictures, verbal encoding is argued to be the best strategy to accomplish serial recall (Flavell et al., 1966), so that verbal encodability should be the major stimulus variable. On the assumption that

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static objects are more likely to evoke verbal encoding and less likely to evoke nonverbal encoding than action pictures, it is predicted that recall will be higher for familiar static objects than for actions, and higher for familiar actions on objects than for actions without objects.

With regard to subject variables, it is hypothesized that middle class children are more likely to use verbal processes and lower class children are more likely to encode sensori-motorically. It is therefore predicted that middle class children will manifest higher recall than lower class children. The gap between the groups, however, is predicted to decrease for action oriented pictures. Lower class children may be better able to process more motorically oriented stimuli. Finally, intelligence is predicted to be positively associated with recall within the lower class, assuming that the characteristic encoding process is better differentiated in smarter children.

Method

Subjects

Forty lower class and twenty middle class white children, half of each sex, were selected on the basis of parental occupation from the first grade of one elementary school serving a semi-rural system in southeastern Michigan. Within each sex, the lower class group was split at the median Peabody Picture Vocabulary Test Intelligence Quotient into a brighter group and a less bright group. A single school was chosen in order to reduce confounding of occupational status by residential and educational diversity; occupational range was also somewhat limited.

Materials

Four arrays of six $3\frac{1}{2}$" x 5" color photographs were used as stimuli for recall. Arrays consisted of: static objects assumed high in verbal codability and familiar in use (comb, glass of milk, guitar, hammer, steering wheel, zipper); the

same objects-in-action, manipulated by hands; activities without easily-named objects performed by a preschool-aged boy and girl in a gymnasium (requested to push, pull, and lift something, and to run, jump, and hang on the bars); and faces made by the same boy and girl instructed to make faces which were funny or emotional (angry, happy, scared, sad, sleepy, stubborn).

Procedure

Form B of the Peabody Picture Vocabulary Intelligence Test was administered in late March. The experimental session, which lasted approximately half an hour, was conducted after an interval varying from four to seven weeks.

Pretraining. Following procedures used by Flavell et al. (1966) and Gratch (1966), children were trained to point in the same order as the experimenter, and to close their eyes during the delay between presentation and recall.

Recall Task. For each of the four arrays, presented in random order, there were two trials of ordered serial recall of three pictures randomly chosen out of the six. During the fifteen-second delay, pictures were reshuffled.

Inquiry. After the recall task, inquiry was made as to use of verbal, ikonic, or enactive strategies. Simple 3" x 5" felt pen drawings were used to probe if the child had difficulty. Examples of these are shown in the Appendix. Children were asked to label and act out pictures. Last, they were asked about liking for the task.

Results

Recall Scores

In scoring, responses in which content was correct but order incorrect were assigned half credit. Mean recall scores appear in Table 1. Planned analysis of variance comparisons tested hypotheses stated in the introductory section. Summary tables for males and females appear as Tables 2 and 3, respectively. The hypothesis of middle class recall superiority over lower class children,

based on differential reliance upon verbal and nonverbal encoding, was not supported. The hypothesis that brighter lower class children would recall better than less bright lower class children was not supported. Results for boys, however, were patterned as expected.

The hypotheses that static objects would evoke higher recall than actions because they would tend to elicit verbal rather than nonverbal processes, and that familiar and easily named objects-in-action would be better recalled than the "purer" action pictures were both supported for both sexes at the .01 level. The prediction that face and activity action pictures may differ in recall because of differential encoding was supported. The tendency for activities to be better recalled than faces was the strongest effect for girls ($p < .01$). Results for boys showed similar patterning, but were not significant.

The hypothesized reduction of class differences for action pictures in comparison to object pictures, and for face and activity pictures in comparison to objects-in-action did not occur. Contrary to the hypothesized facilitation of lower class recall by action contexts, the greatest (nonsignificant) class difference involved objects-in-action, for boys. Girls' data were inconsistent. Recall of static objects tended to be high for both strata, while recall of faces and activities was low for both groups. Intelligence, however, yielded an interaction significant for boys at the .05 level: within action pictures, the presumed high codability of objects-in-action facilitated recall for brighter lower class boys while negligibly affecting recall for less bright lower class boys. The girls' tendency to recall faces better than activities was greater for the less bright lower class girls than for the other groups ($p < .05$).

Encoding Processes

The labels given pictures by the children were used to verify assumptions about relative codability of the four stimulus types. Verbal codability was

indexed by number of categories necessary to sort the children's labels for each picture. Mean scores appear in Table 4. These data were submitted to analysis of variance; the summary appears as Table 5. The effect of picture type was significant at the .01 level for both sexes, supporting the assumptions about verbal codability underlying hypotheses about picture effects on recall. Despite the lack of significance in recall, however, the brighter boys' groups used more codable labels than the less bright blue collar boys ($p < .025$). While reported use of verbal strategies paralleled recall patterns for group and picture effects, the class-intelligence group were of borderline significance ($X^2 = 3.8$, $p < .10$ for 1 df).

Although all children labelled almost all stimuli, significantly more boys than girls refused the experimenter's requests to act out pictures ($X^2 = 9.6$, $p < .01$ for 1 df). Spontaneous verbalization was frequent, and spontaneous motoric enactment was rare, although the tendencies were reversed for faces.

Liking

Children's responses to questions about the best and worst-liked parts of the session are summarized in Table 6. Although there were no group differences in general positive evaluative responses, middle class children reported the memory task proper as the best portion of the session significantly more than lower class children ($X^2 = 6.8$, $p < .01$, df = 1). More lower class than middle class children indicated acting out of the pictures as either best or worst, to reach borderline significance ($X^2 = 2.9$, $p < .10$, df = 1). Also, significantly more lower class than middle class children referred to the faces as worst, and as best or worst combined ($p < .001$, df = 1, and $X^2 = 15.9$ and 18.9 respectively).

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Discussion

The effects of picture type on serial recall generally corroborated predictions: easily named objects and actions upon them are better remembered than

relatively harder to name activities and faces. Occupational status alone did not predict recall differences in this relatively small, homogeneous, and well-cared-for school, further, this lack of effect occurred despite the association between status and liking (or salience) of aspects of the task (i.e. memory, faces, acting out pictures) which varied in apparent demand for verbal mediation or immediate motoricity.

The interaction between pictures and class-intelligence for boys, suggests, moreover, that motoric cues may have interfered with recall for the less bright lower class boys. The object pictures, easily named and lacking action context, were well recalled by all. Activities and faces were more difficult to verbalize and possessed action content; these also evoked a comparatively high ratio of motoric to verbal spontaneous expression. Most groups did poorly on both. Objects-in-action were both highly verbally encodable and in action contexts. The significant interaction effect indicated that recall was facilitated, if anything, for middle class boys, while the less bright lower class boys' recall was at the same low level as recall of other action pictures. It appears as if the static context was helpful to the less bright lower class boys, while the motoric possibility seduced them into less efficient motoric processing. There is also some suggestion in the incidence and nature of refusals to act out, that brighter lower class boys actively inhibit motoricity.

Despite the hopes with which this study was designed therefore, there is little evidence that "relevant" motoric materials facilitate recall in lower class children in this task setting. There was a slight tendency for middle class boys to recall objects-in-action better than objects, so that it may be helpful as an ancillary mode. There was also the interesting superiority of activity to face recall in girls, particularly in less bright lower class girls. Since part of the difficulty of activities may have been stimulus similarity, it

may be that motoric encoding was enhanced for the less bright lower class same-sexed learners, and that the effect manifested itself in the absence of efficient verbal encoding possibilities. The idea that motoric encoding is more likely when pictured actors are of the same sex as the subject is supported by research indicating that frequency of modeling responses is affected by similarity of the available model to the subject (Bandura, Ross, & Ross, 1961; Dubanoski & Parton, 1971; Rosenkrans, 1967).

Sex differences in general are difficult to interpret in the light of differences in sample characteristics. The girls' groups were significantly less bright, and somewhat less differentiated with regard to parental occupational status, geographical origin of parents, and mean and range of number of siblings, than were the boys'.

Finally, the lack of significance of socioeconomic status as a main effect in recall raises the important question of the functional variables underlying class differences. The present study suggests that the distinction between manual and nonmanual parental occupation raised by Kohn (1963) may affect values and perhaps verbal encoding efficiency but not recall. Miller and Swanson (1966), working in the same geographic area as the present investigation, also found relationships with status to fall short of significance outside of major cities. They suggested that children in smaller cities might have more intimate contact with each other across class, for example by attendance at the same schools, than children in major cities, and that this association might serve to reduce class differences in "taste and temper" (1966, p. 102). In the present study, those differences which remained did not involve corresponding differences in recall performance.

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Footnote

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Table 1

Mean Recall Scores

Stimuli	Males				Females			
	Middle class	Lower class bright	Lower class less bright	All males	Middle class	Lower class bright	Lower class less bright	All females
Objects	3.2	3.0	2.7	3.0	2.7	3.2	2.6	2.8
Objects-in-action	3.5	2.8	1.7	2.7	2.6	3.5	2.6	2.9
Activities	2.5	1.5	1.6	1.9	2.6	2.3	3.1	2.7
Faces	1.8	1.5	1.6	1.6	1.6	1.7	0.9	1.4
All pictures	2.8	2.2	1.9	2.3	2.4	2.7	2.3	2.5

Table 2

Summary of Analysis of Variance on Recall Scores: Males

Source of Variation	df	SS	MS	F
Between subjects				
Class-intelligence groups[a]	(2)	(14.12)		
Comparisons:				
M vs. $L_1 + L_2$	1		3.15	< 1.00
L_1 vs. L_2	1		.38	< 1.00
Error	27		3.18	
Within subjects				
Pictures[a]	(3)	(35.49)		
Comparisons:				
O vs. A	1		18.23	13.98**
A_o vs. $A_a + A_f$	1		16.20	12.43**
A_a vs. A_f	1		1.07	< 1.00
Class-intelligence group x Picture	(6)	(85.93)		
Comparisons:				
M vs. $L_1 + L_2$ x O vs. A	1		1.01	< 1.00
M vs. $L_1 + L_2$ x A_o vs. $A_a + A_f$	1		2.03	1.55
M vs. $L_1 + L_2$ x A_a vs. A_f	1		1.41	1.03
L_1 vs. L_2 x O vs. A	1		.00	< 1.00
L_1 vs. L_2 x A_o vs. $A_a + A_f$	1		5.21	4.00*
L_1 vs. L_2 x A_a vs. A_f	1		.03	< 1.00
Error	81		1.30	
Total	119			

[a] M = middle, L_1 = brighter lower, L_2 = less bright lower class; O = object, A= action, A_o = object-in-action, A_a = activity, A_f = face pictures.
*p $<$ .05, **p $<$ .01

Table 3

Summary of Analysis of Variance of Recall Scores: Females

Source of Variation	df	SS	MS	F
Between Subjects				
Class-intelligence groups[a]	(2)	(3.15)		
Comparisons:				
M vs. $L_1 + L_2$	1		.03	< 1.00
L_1 vs. L_2	1		.70	< 1.00
Error	27		2.13	
Within subjects				
Pictures[a]	(3)	(44.97)		
Comparisons:				
O vs. A	1		11.48	7.84**
A_o vs. $A_a + A_f$	1		15.02	10.26**
A_a vs. A_f	1		24.07	16.43**
Class-intelligence group x picture	(6)	(11.38)		
Comparisons:				
M vs. $L_1 + L_2$ x O vs. A	1		.07	< 1.00
M vs. $L_1 + L_2$ x A_o vs. $A_a + A_f$	1		1.34	< 1.00
M vs. $L_1 + L_2$ x A_a vs. A_f	1		.53	< 1.00
L_1 vs. L_2 x O vs. A	1		.34	< 1.00
L_1 vs. L_2 x A_o vs. $A_a + A_f$	1		2.70	1.84
L_1 vs. L_2 x A_a vs. A_f	1		6.40	4.37*
Error	81		1.47	
Total	119			

[a]M = middle, L_1 = brighter lower, L_2 = less bright lower class; O = object, A = action, A_o = object-in-action, A_a = activity, A_f = face pictures.
*p < .05 **p < .01

Table 4

Verbal Codability - Number of Categories Used by Each Class-Intelligence-Sex Group for Each Picture Type, Averaged Over Pictures

	Males				Females				
Stimuli	Middle class	Lower class bright	Lower class less bright	All males	Middle class	Lower class bright	Lower class less bright	All females	Total
Objects	1.17	1.83	3.16	3.75	2.83	2.33	2.66	4.75	6.50
Objects-in Action	2.66	2.33	2.50	3.17	3.08	2.25	2.66	3.92	4.67
Activities	5.08	4.58	5.08	9.75	4.67	4.00	4.33	8.17	12.83
Faces	3.83	4.17	5.00	7.08	3.83	5.33	4.42	7.42	10.75
Group Means	3.19	3.23	3.94	3.45	3.60	3.48	3.52	3.53	

Table 5

Summary of Analyses of Variance on Verbal Codability of Pictures (Number of Categories for Labels)

Source of Variation	df	MS[a]	F[a]
Between stimuli			
Pictures	3	34.67 19.38	7.81*** 6.98***
Error	20	4.44 2.78	
Within stimuli			
Class-intelligence group	2	4.26 .01	4.29** < 1
Class-intelligence group x picture	6	1.60 1.81	1.61 2.13*
Error	40	.99 .85	
Total	71		

[a]Male entries above female entries for each comparison
*** significant at .01 level
** significant at .025 level
* significant at .10 level

Table 6

Number of Subjects Choosing Selected Aspects

of the Session As Most and Least Liked

Task Aspect	Middle Class		Lower Class	
	Male (N=10)	Female (N=10)	Male (N=20)	Female (N=20)
General Positive Evaulation -- i.e., "All good" or "nothing bad"	3	4	5	7
Memory Task				
liked best	5	4	4	7[a]
liked worst	0	2	2	2
Naming Pictures				
liked best	1	0	1	1
liked worst	0	1	0	1
Acting Out the Pictures				
liked best	1	0	2	4
liked worst	1	1	4	2[b]
Faces -- making faces or just seeing the faces				
liked best	0	1	5	3
liked worst	2	0	3	8[c]

[a]Combining sexes, class differences in "liked best" were significant at the .01 level by Chi-Square (2-tailed).

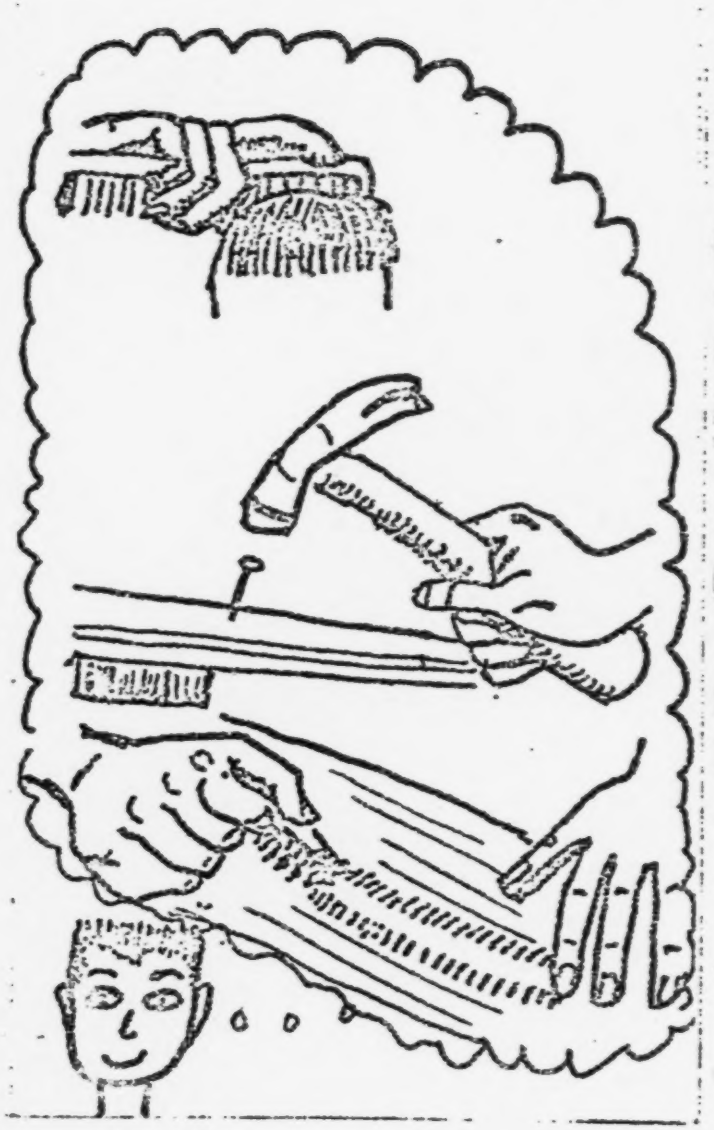
[b]Combining sexes and combining "liked best" with "liked worst", classes differed at the .10 level by Chi-Square (2-tailed).

[c]Combining sexes, classes differed in "liked worst" at the .001 level by by Chi-Square (2-tailed). Combining "liked best" with "liked worst" revealed a class difference significant at .001 by Chi-Square (2-tailed).

Appendix[1]

Drawings Used to Illustrate Probes

Objects-in-Action



[1]Each set is presented in the order enacting ikonic, verbal.